



DCODE



Decision Making Constructs in a Distributed Environment

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Overall Objectives

- Improve the quality of group decision making by
 - (1) enhancing the ability of each participant to **assess/evaluate** their pool of disparate information findings
 - (2) simplifying the process by which participants **share** uniquely held information
 - (3) improving the process for **integrating** this shared information into the on-going decision process and
 - (4) developing information “drill down” capabilities so that participants can quickly focus on the differing subjective assessments that are causing lack of **decision consensus**.



This year's Objectives

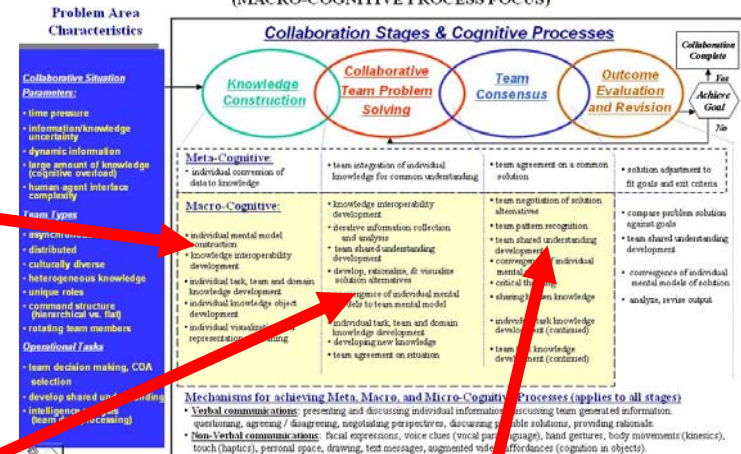


- Expand development of IOBs
- Interface with EWALL project

Contribution to CKM

COLLABORATION AND KNOWLEDGE MANAGEMENT (CKM) PROGRAM

STRUCTURAL MODEL OF TEAM COLLABORATION (MACRO-COGNITIVE PROCESS FOCUS)



What are the task parameters?

- individual mental model construction
- knowledge interoperability development

What is the data saying?

- iterative information collection and analysis
- team shared understanding development
- develop, rationalize, & visualize solution alternatives

What is the group decision?

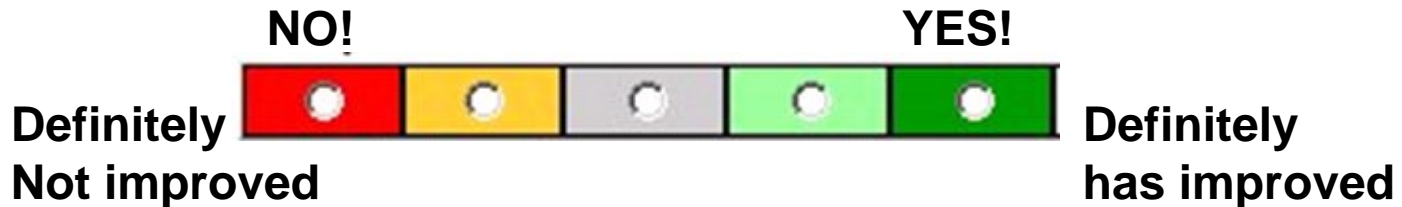
team negotiation of solution alternatives

- team pattern recognition
- team shared understanding development
- convergence of individual mental models
- sharing hidden knowledge



Sample Decision Making Task

- We have spent a lot of money over the last two years on improving airport security.
- Has Airport Security significantly improved?
 - Review reports and assign an overall effect/impact score to the results:



Subjective conclusions from each of the reports

Vulnerabilities and Potential Improvements for the Air Cargo System: Airport Security Gets Another 'F'

What GAO Found

Numerous government and industry studies have identified vulnerabilities in the air cargo system. These vulnerabilities occur in the security of some air carriers and freight forwarders and in possible tampering with cargo at various handoffs that occur from the point when cargo is loaded onto an aircraft. As a result, weaknesses in this program could create security risks.

FAA or the TSA's responsibility for air cargo security has been a key issue since 1990 by this site's readers.



Security on US domestic flights is a key issue since 1990 by this site's readers.

US airline security has suffered a major breach in history.

At least four separate teams of investigators have been working around the clock for hours of each other.

But security experts say the terrorists had been planning with virtually no warning.

Security on US domestic flights is so relaxed that

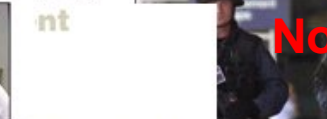
Yes!

LOS ANGELES, Sept. 3, 2002

(CBS) In January and February, CBS went undercover to test the security of American airports. We found major weaknesses, which block X-rays at checkpoints.

Steve Elson, who used to be a security guard for the Federal Aviation Administration, helped us.

"When the bag goes through the X-ray, it's not checked."



to CBS/AP

nt

On NRO

Security, Smith's Way The cyber model.

By James D. Miller, assistant professor of economics, Smith College, October 30, 2001 9:45 a.m.

Unleash the marketplace to strengthen airport security. The socialist solution of federalizing airport-security workers will deny us the creativity we need to fight terrorists. Only by utilizing the constant competition that the free market provides can we protect America's skies.

Computer networks have to endure incessant attacks from hackers. Network providers have to continually strengthen their defenses to ward off new types of assaults. Hackers have consequently increased computer security and have made the U.S. more resistant to terrorist cyber-attacks. Computer security is not provided by the government, but rather by a marketplace that punishes any firm that can't protect its electronic assets. America's airplanes should be protected by a similar free market approach.

No!

AIRPORT PASSENGER SCREENING

Preliminary Observations on Progress Made and Challenges Remaining

What GAO Found

The Transportation Security Administration (TSA) was tasked with the immediate challenge of building a large federal agency responsible for screening passengers and baggage at airports. Although TSA has made significant progress, challenges remain.

TSA recognized that ongoing effective regulatory training is essential. However, TSA has not fully completed its training program. Although TSA has made significant progress, challenges remain.

GAO's report provides an overview of security measures and challenges reported during the past decade at the country's busiest airports. Further below, you can find a table of security breaches at the top 25 airports.



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THE STERILE AIRPORT

Near-total airport security is possible. Technologies are in sight to seal the leaks, spot the bad guys, find the bombs.

by Dan Tynan

AIRPORT SECURITY FOR THE 9/11 AGE

Recent dummy-weapon tests at airports show it's still possible to get guns through security, here's how a super-secure airport would work.

We asked Iotek Inc., a Denver-based security systems design firm, to help us engineer an airport that would target terrorists without gumming up passenger traffic. We also sought input from Comstock Inc., a Washington Technology, Design and Construction Systems, and other companies that make state-of-the-art security equipment. In this exercise, money was no object; safety was our only concern.

We set a target date of five years from now. But much of the technology is available, or will be very soon. The goal: Every person, every bag, and all supplies and equipment in an airport will be tagged, tracked, and instantly locatable.

I. CHECK-IN AND SECURE ID

Initial safeguards appear a mile outside the airport. Scanners at tollbooth-like structures along access roads aim their laser scanners at

Illustration by Jameson Simpson

save this | email this | print this | most popular

No

Yes

Yes

Yes

Yes

Yes

Yes

Yes

Yes

Yes

Yes

Yes

Yes

Yes

Yes

Yes

Yes

Yes



DCODE Solution: Convert IMPLICIT subjective estimates into EXPLICIT estimates.



Credibility?



Effect/Impact?



Importance?



Timeliness?

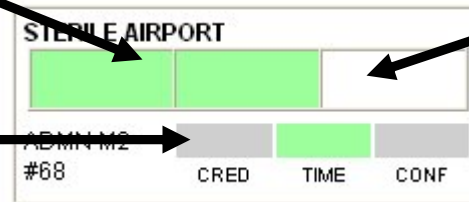


Encapsulate the scores into an icon (called an Information Object, IOB) that displays information quality, impact and importance

Effect/Impact: **Color**

Quality of information

Information **Importance:**
Size of color bar (1, 2 or 3 sections filled)



IOB

Another look at the 10 reports

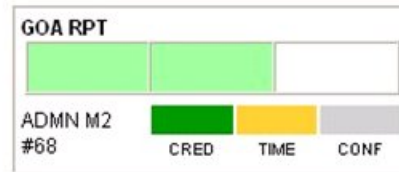
IMPORTANCE

Very
High

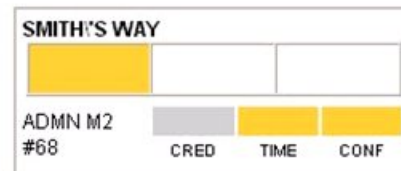


**Drop all items with below average
Source Credibility.**

High



Average



← **High** ----- Source Credibility ----- **Low** →

The decision environment:

Vulnerabilities and Potential Improvements for the Air Cargo Security Gets Another 'F'

What GAO Found

Since our previous report, industry studies have identified vulnerabilities in the security of air cargo systems. These vulnerabilities occur in the security of cargo screening and freight forwarders and in possible time delays at cargo handling that occur from the point where cargo is loaded to the point where it is loaded onto an aircraft. As a result, weaknesses in this program could create security risks.

FAS or the T US airport security under fire

responsibility key recovery after 9/11

Security on US domestic flights

By BBC News Online's SI

US airline security has not

breach in history.

At least four separate tea

boarded planes and hours

hours of each other.

But security experts say

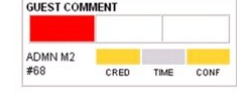
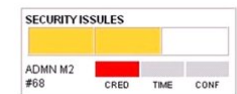
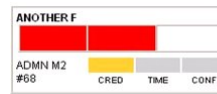
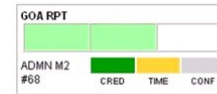
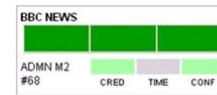
the terrorists had been

presented with virtually

an open goal.

Security on US domestic

flights is so relaxed that



Documents

vs

IOBs



DCODE IOB Process



What are the key Essential Elements that need to be Abstracted from an Information Item?



- Where does it **Fit?**
 - i.e. which decision criteria/factor (e.g. cost, risk, etc.)?
- How good is the information **Quality?**
 - What is the Credibility of the source?
 - How Timely is this information?
 - How much Confidence do I have in the information?
- What is the **Effect/impact** of the information on the criterion?
 - **Positive or Negative?**
 - **Strong or Weak?**
- What is the **Importance** of this item relative to other items?



We access these subjective assessments via an **Abstraction Template** Structure

Keyword

Criteria **Fit**

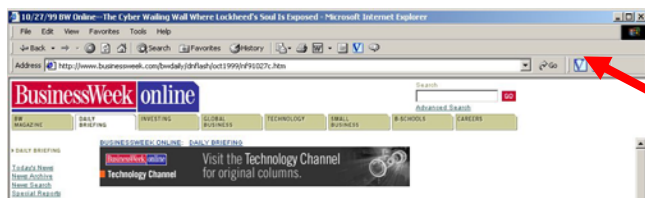
Information
Quality
Assessment

Effect/impact

Relative
Importance

Title:	Aug 02 contract									
Criterion:	<input type="radio"/> HIST <input type="radio"/> ADMN <input type="radio"/> GAIN <input type="radio"/> PROB									
	V.Low/Poor		Avg.		V.High/Good					
Credibility:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	?	<input type="radio"/>	?	
Timeliness:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	?	<input type="radio"/>	?	
Confidence:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	?	<input type="radio"/>	?	
	V.Neg.		Neutral		V.Pos.					
Effect:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	?	<input type="radio"/>	?	
Importance:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	?	<input type="radio"/>	?	
	Discard		(1)Avg.		(2)High		(3)V.High			
Submit		Reset		Close						

We display/share these assessments using an Information Object (IOB)



Step 1: Select document for retention

Title:

Criterion: ☐ HIST ☐ ADMN ☐ GAIN ☐ PROB

V.Low/Poor Avg. V.High/Good

Credibility: ☐ ☐ ☐ ☐ ☐ ? ☐ ?

Step 2: Activate Abstraction Template

Title:

Criterion: ☐ HIST ☐ ADMN ☒ GAIN ☐ PROB

V.Low/Poor Avg. V.High/Good

Credibility: ☐ ☒ ☐ ☐ ☐ ? ☐ ?

Timeliness: ☐ ☒ ☐ ☐ ☐ ? ☐ ?

Confidence: ☐ ☒ ☐ ☐ ☐ ? ☐ ?

V.Neg. Neutral V.Pos.

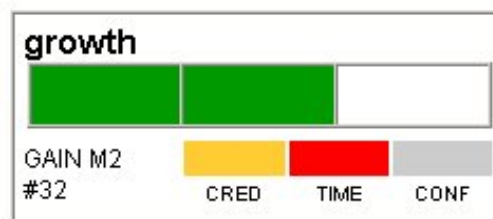
Effect: ☐ ☒ ☐ ☐ ☐ ? ☐ ?

Importance: ☐ ☐ ☒ ☐ ? ☐ ?

Discard (1)Avg. (2)High (3)V.High

Step 3: Complete Assessment

DCODE Software creates and stores an **Information Object (IOB) in designated database**





Information Objects (IOBs)



The creation, use and sharing of
Information Objects (IOBs) is
the key critical concept
in DCODE.

Information Object (IOB)

An IOB is an iconic encapsulation of the subjective assessments an individual has assigned to a particular information item.

It is automatically created from the completed abstraction template.

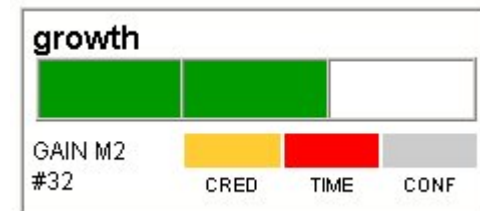
It is analogous to military tactical symbology.



Original document



IOB Representation of subjective assessments



IOB Encapsulation Process

Title:

Criterion: ☐ HIST ☐ ADMN ☒ GAIN ☐ PROB

V.Low/Poor Avg. V.High/Good

Credibility: ☐ ☐ ☐ ☐ ☐ ☐ ? ☐ ?

Timeliness: ☐ ☐ ☐ ☐ ☐ ☐ ? ☐ ?

Confidence: ☐ ☐ ☐ ☐ ☐ ☐ ? ☐ ?

V.Neg. Neutral Pos.

Effect: ☐ ☐ ☐ ☐ ☒ ☐ ? ☐ ?

Importance: ☐ ☐ ☒ ☐ ? ☐ ?

Discard (1)Avg. (2)High (3)V.High

Importance:

Discard

Avg.

High

V. High

Who originated the IOB

Unique identifier

Hyperlinked to doc.

growth

GAIN M2

#32

CRED TIME CONF

Effect/Importance Coding

IMPORTANCE

size, size, size

Average

High

Very High

Importance
"Power bar"

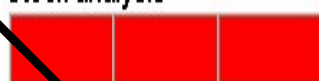
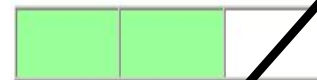
EFFECT ON CRITERION IS COLOR-CODED

Very Negative

Negative

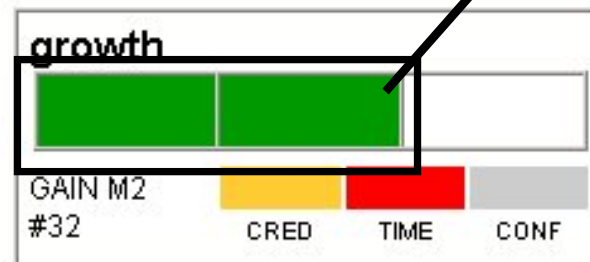
Positive

Very Positive



2 Squares

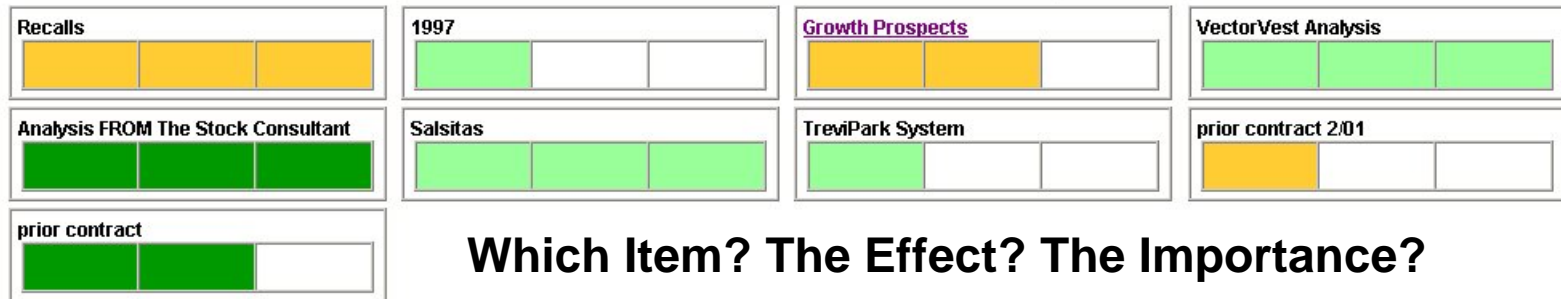
Dark Green



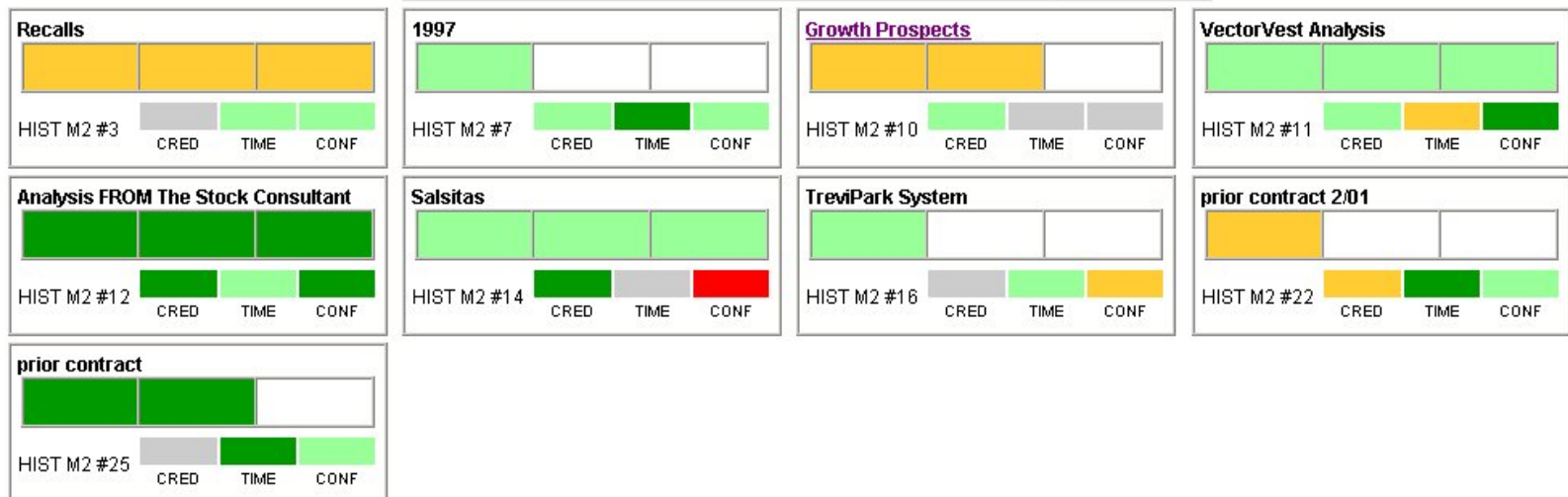
Document is of High Importance and has a Very Positive effect on the Gain Criterion

De-Cluttering the Display

Minimal View (keyword, effect, importance)

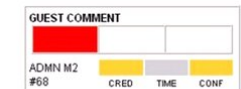
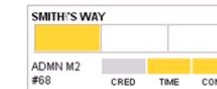
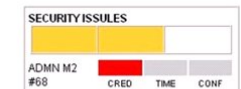
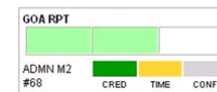
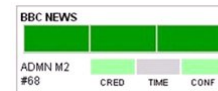


Full View (all parameters) available as a drill-down capability





- IOBs improves an individual's decision making ability by simplifying the evaluation of disparate information sources.





Sharing and Integration of Information



IOB Sorting/Analysis Techniques

Participant's Individual Display

HIST	ADMN	GAIN	PROB
Overall Decision Recommendation:			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
			<input type="button" value="Share"/>

[\[Clear Ratings\]](#)

Give me non-redundant IOBs from other group members

View:

Sort by: ,

Minimal View: ☒

Group Comparison

? Board

For demonstration purposes, a few of the IOB's are hyperlinked to demo documents/URL's.

History

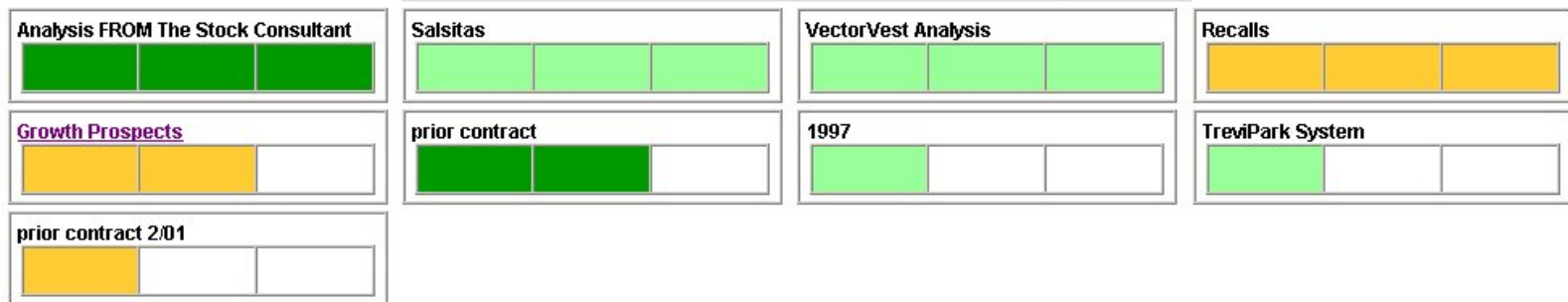
Overall Criterion Score:			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
			<input type="button" value="Submit"/>
		[Add Group] [Full View]	

Recalls	1997	Growth Prospects	VectorVest Analysis
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Analysis FROM The Stock Consultant	Salsitas	TreviPark System	prior contract 2/01
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



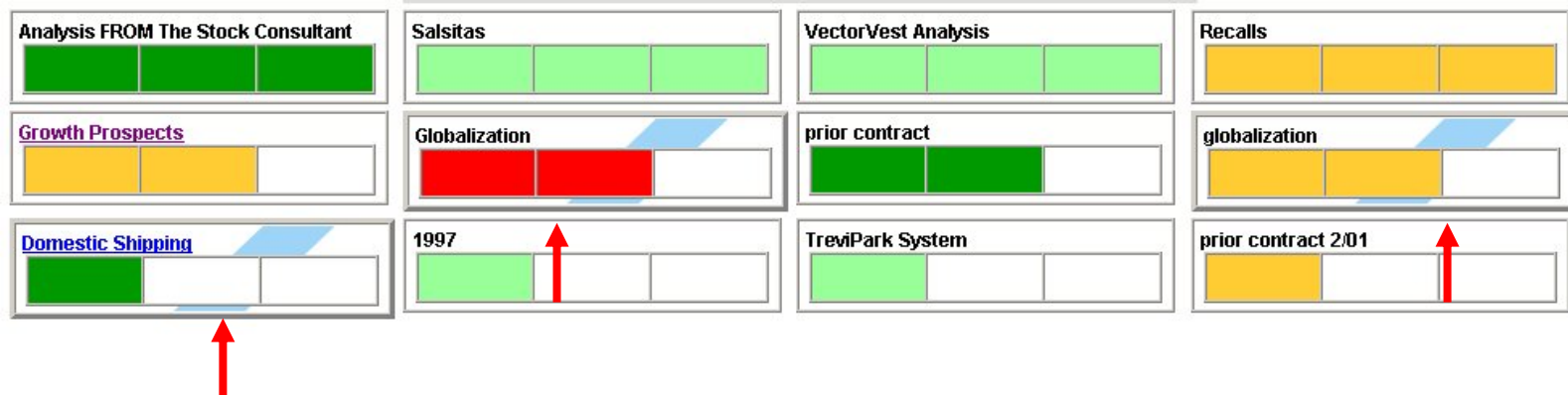
DCODE Provides “one-click” sharing of Uniquely Held Information

Information that I have:



“Add Group”

Adds three new group IOBs



[illegible]

Add Group

Key Concepts in IOB Application to Shared Understanding

INFORMATION ABSTRACTION



Title:

Criterion: ☐ HIST ☐ ADMN ☐ GAIN ☐ PROB

Credibility: ☐ V.Low/Poor ☐ Avg. ☐ V.High/Good

Timeliness: ☐ ☐ ☐ ☐ ☐ ? ☐ ?

Confidence: ☐ ☐ ☐ ☐ ☐ ? ☐ ?

Effect: ☐ V.Neg. ☐ Neutral ☐ V.Pos. ☐ ? ☐ ?

Importance: ☐ Discard ☐ (1)Avg. ☐ (2)High ☐ (3)V.High

Submit Reset Close

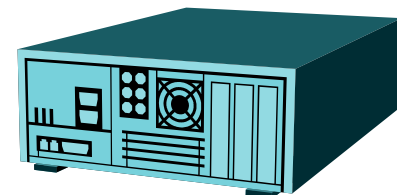
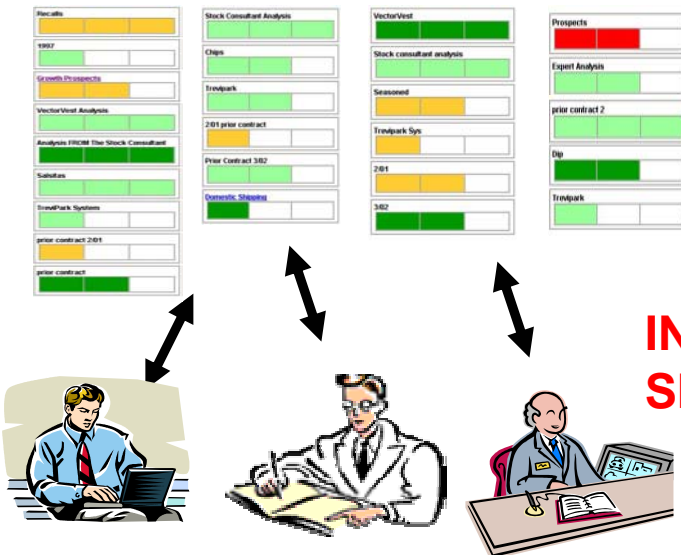
INFORMATION ENCAPSULATION

growth

GAIN M2 #32

CRED TIME CONF

INFORMATION SHARING






New Concepts (not in demo)



- Entering personal knowledge
- Encoding Quality of Information
- The “EQI” bar

Two Information Sources:

RED CROSS RESCUE CORPS



Source: British Red Cross
Date: 14 Feb 2001

Red Cross resc

Red Cross emergency team Salvador and pulled at least 100 patients evacuated from the area.

The earthquake measured 6.5 on the Richter scale. Occurring just one month after a similar quake in the same area.

Some 300 Red Cross volunteers were deployed to the area. Within the first few days, the distributed rolls of plastic sheeting to the victims. Federation teams were dispatched to the area.

"The water supply system was damaged. It is essential for the population", says Iain Logan.

Delegates were still in the present in the worst affected areas. Vincente, and medical team Red Crescent appeal will be sent to assist the four district hospital teams were sent to assist the hospital staff and gathered shelter material to set up open air wards.

Ready to respond at short notice

Hjelpekorpsset [Red Cross Rescue Corps] is Norway's largest volunteer rescue preparedness organisation. It's main objective is to assist at the scene of an accident both during and after natural disasters and to provide other humanitarian relief.

Hjelpekorpsset aims to train its members to be prepared and ready to respond effectively and to spread awareness of general first aid. Hjelpekorpsset aims to be a quality leader within the relevant areas; by caring and taking responsibility and initiative for people who need help and compassion.

Today, Hjelpekorpsset has more than 15,000 volunteers, aged 17 and over. Hjelpekorpsset is an extremely active organisation and each member spends a considerable number of hours yearly educating themselves and carrying out rescue work. There is a rescue corps on emergency standby at 335 locations across the country.

Title: **PK**

Criterion: ☐ HIST ☐ ADMN ☐ GAIN ☐ PROB

Credibility: ☐ V.Low/Poor ☐ Avg. ☐ V.High/Good

Timeliness: ☐ V.Low/Poor ☐ Avg. ☐ V.High/Good

Confidence: ☐ V.Low/Poor ☐ Avg. ☐ V.High/Good

Effect SEAT: ☐ V.Neg. ☐ Neutral ☐ V.Pos.

Importance: ☐ Discard ☐ (1)Avg. ☐ (2)High ☐ (3)V.High

Save/Share **Save** **Reset** [Close](#)

(1) Internet, Documents, Databases, etc

...and (2) Personal Knowledge

Title: **PK**

Criterion: ☐ HIST ☐ ADMN ☐ GAIN ☐ PROB

Credibility: ☐ V.Low/Poor ☐ Avg. ☐ V.High/Good

Timeliness: ☐ V.Low/Poor ☐ Avg. ☐ V.High/Good

Confidence: ☐ V.Low/Poor ☐ Avg. ☐ V.High/Good

Effect SEAT ☐ V.Neg. ☐ Neutral ☐ V.Pos.

Importance: ☐ Discard ☐ (1)Avg. ☐ (2)High ☐ (3)V.High

Save/Share **Save** **Reset** [Close](#)

“Personal Knowledge”



A click here produces a text box for information entry:

Created by: M1 BILL
On: 9/23/03 1705

In 1998 I was involved in a Simulated NEO, and we found that....

Save/Finish

Information Coding

- Three most critical elements are:
- Effect/Impact : Color (4 or 5 levels)



- Importance: Size (3 levels)



- Quality: Composite of several parameters

Color Pattern (2 levels)

Quality is
Average
or Better



Quality is
Below
Average

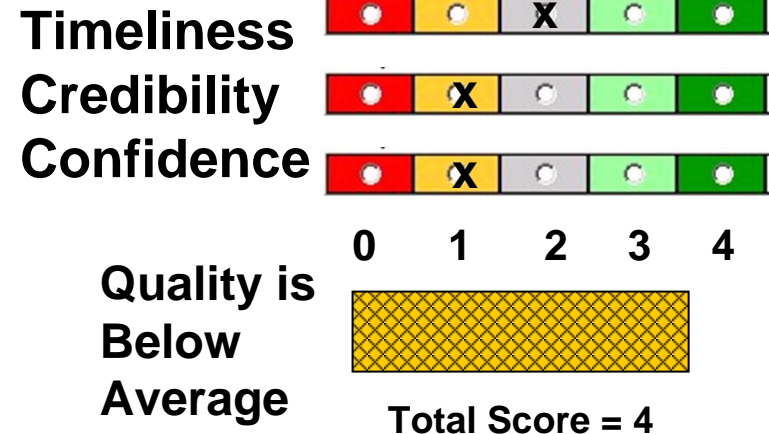
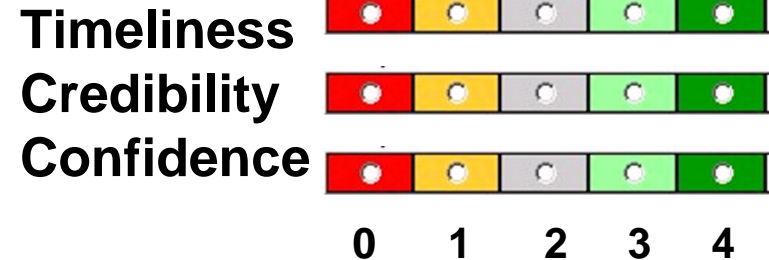
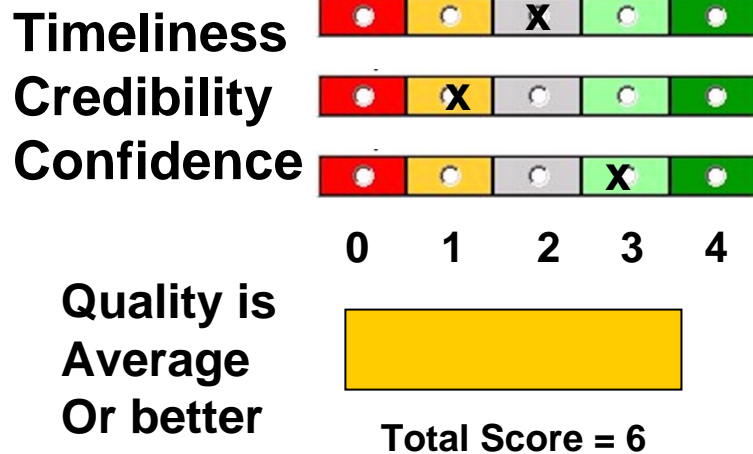




Coding Quality of Information

Quality is a composite score:








Decision Team sets up a scoring algorithm, e.g.
“flag any total score 5 or less”









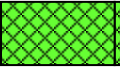
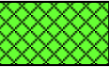










The Effect/Quality/Importance (EQI) Bar










AVERAGE IMPORTANCE

	Quality	
	Good	?
Very Pos.		
Pos.		
Neg.		
V. Neg.		

HIGH IMPORTANCE

	Quality			
	Good		?	
Very Pos.				
Pos.				
Neg.				
V. Neg.				

VERY HIGH IMPORTANCE

	Quality					
	Good			?		
Very Pos.						
Pos.						
Neg.						
V. Neg.						



Do IOBs really help?



PG School Experiment 18 Officers (Summer 03)



- Display: Text vs IOBs
- Decision: Positive vs Negative

		Display		
		Text Only	IOBs	
Decision	Positive	N=5	N=5	N=10
	Negative	N=4	N=4	N=8
		N=9	N=9	N (tot)=18



Task:

- Should we use Islandia as the refugee site?
- Sees 30 information items (randomized)
 - 5 decision criteria
 - 6 items per criteria



The Five Decision Criteria

[**COM**munications - **TSP**ortation - **LAB**or - **ADM**istration - **SAN**itation]

- **Communications Facilities (COM):** Assess the communication facilities that are available in Islandia, including land telephone systems, radio, TV, cellular phone availability and coverage, etc.
- **Transportation Facilities (TSP):** Assess the transportation facilities that are available in Islandia, including roads, docks, airports, etc.
- **Labor Pool (LAB):** Assess the labor pool that would be available to staff the camp in Islandia, including size of the pool, quality of workers, work ethic/tradition, etc.
- **Administrative Requirements (ADM):** Assess the administrative requirements needed to set up the camp in Islandia, including, permits, fees, environmental considerations, bureaucratic red tape, graft, bribes, etc.
- **Sanitation/Health/Medical conditions (SAN):** Assess the sanitation, health and medical conditions expected in Islandia, including drinking water, sewerage disposal, medical facilities, infectious diseases, etc.

Text Condition (9 subjects)

1/30

....A cultural tradition in Islandia is that each worker is given a single two month vacation each year, which he can take any time during the year. All the employee has to do is give the employer a one week notice before going on vacation. This has caused unexpected and disrupted work shortages when several employees elect to take the vacation at the same time....

Criterion:

COM <input type="radio"/>	TSP <input type="radio"/>	LAB <input type="radio"/>	ADM <input type="radio"/>	SAN <input type="radio"/>
------------------------------	------------------------------	------------------------------	------------------------------	------------------------------

Submit >

[**COM**munications - **TSP**ortation - **LAB**or - **ADM**istration - **SAN**itation]

- **Communications Facilities (COM):** Assess the communication facilities that are available in Islandia, including land telephone systems, radio, TV, cellular phone availability and coverage, etc.
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- **Sanitation/Health/Medical conditions (SAN):** Assess the sanitation, health and medical conditions expected in Islandia, including drinking water, sewerage disposal, medical facilities, infectious diseases, etc.

Read this, then assign it to one of the five criteria

(do 30 of these)

IOB Condition (9 subjects)

1/30

The environmental protection effort in Islandia is poorly organized and has had little effect. Environmental impact is not a consideration in any awarding of construction permits.

Read this, then:

Title:	<input type="text"/>				
Criterion:	COM <input type="radio"/>	TSP <input type="radio"/>	LAB <input type="radio"/>	ADM <input type="radio"/>	SAN <input type="radio"/>
Effect:	Very Neg. <input type="radio"/>	Neg. <input type="radio"/>	Pos. <input type="radio"/>	Very Pos. <input type="radio"/>	
Submit >					

Assign a keyword

Assign it to a criterion

Evaluate its effect on the criterion

[**COM**munications - **TSP**ortation - **LAB**or - **ADM**istration - **SAN**itation]

- **Communications Facilities (COM):** Assess the communication facilities that are available in Islandia, including land telephone systems, radio, TV, cellular phone availability and coverage, etc.
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- **Administrative Requirements (ADM):** Assess the administrative requirements needed to set up the camp in Islandia, including, permits, fees, environmental considerations, bureaucratic red tape, graft, bribes, etc.
- **Sanitation/Health/Medical conditions (SAN):** Assess the sanitation, health and medical conditions expected in Islandia, including drinking water, sewerage disposal, medical facilities, infectious diseases, etc.

Completed Item (IOB)

3/30

".... The major ports of Islandia are less than three days sailing from the primary disaster recovery supply center at Naha. Naha also has three supply ships that are permanently loaded to be used in quick response assistance..."

Title:	ports									
Criterion:	COM		TSP		LAB		ADM		SAN	
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Effect:	Very Neg.		Neg.		Pos.		Very Pos.			
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Submit >										

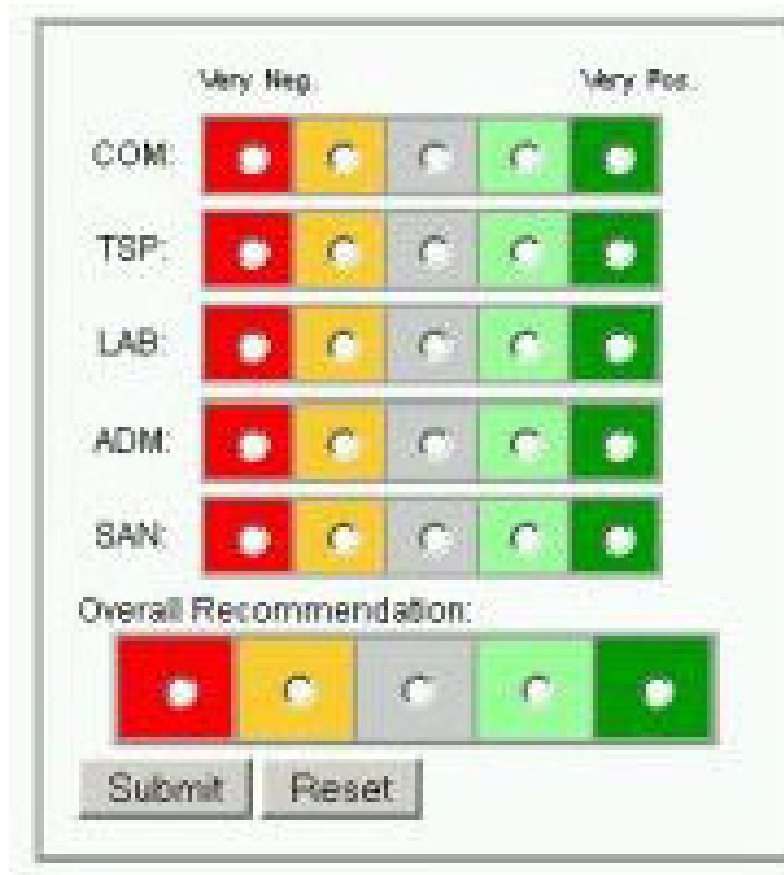
[**COM**munications - **TSP**ortation - **LAB**or - **ADM**istration - **SAN**itation]

- **Communications Facilities (COM):** Assess the communication facilities that are available in Islandia, including land telephone systems, radio, TV, cellular phone availability and coverage, etc.
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- **Sanitation/Health/Medical conditions (SAN):** Assess the sanitation, health and medical conditions expected in Islandia, including drinking water, sewerage disposal, medical facilities, infectious diseases, etc.

Completed IOB

(does 30 of these)

Decision Tasks:



Very Neg. Very Pos.

COM:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TSP:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
LAB:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ADM:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
SAN:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Overall Recommendation:

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Submit Reset

**5 Criteria Decisions,
1 Overall Decision**

Decision Display: Text

View:

Communications

The environmental protection effort in Islandia is poorly organized has has little effect. Environmental impact is not a consideration is any awarding of construction permits.

A recent disaster simulation exercise in Islandia showed that the Emergency Medical were very inadequate in terms of handling anything other than the smallest disaster situation.

.... The major ports of Islandia are less than three days sailing from the primary disaster recovery supply center at Naha. Naha also has three supply ships that are permanently loaded to be used in quick response assistance....

Every small town in Islandia has at least one phone

....The major air route to Islandia is from Chenche. That route, however, requires that we fly over the nation of Gambist, and Gambist has denied permission to fly over their airspace. The two options are to modify the flight plan or to use another departure airport. Both of these options results in excessively long flights, limits cargo capacity, and reduces the daily amount of supplies that can be transported to Islandia...

Very Neg.

Very Pos.

COM: ☐ ☐ ☐ ☐ ☐

TSP: ☐ ☐ ☐ ☐ ☐

LAB: ☐ ☐ ☐ ☐ ☐

ADM: ☐ ☐ ☐ ☐ ☐

SAN: ☐ ☐ ☐ ☐ ☐








Overall Recommendation: ☐ ☐ ☐ ☐ ☐

The items the subject assigned to the Communications criterion

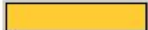
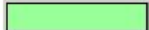
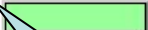



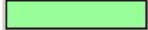

Decision Display: IOB

View:


























Communications

104: 77 COM 	109: 99 COM 	95: 666 COM 
114: 567 COM 	121: rtttt COM 	99: 11 COM 
120: ertt COM 		






Transportation

100: 22 TSP 	105: 775 TSP 	96: 777 TSP 
94: ports TSP 	93: 666 TSP 	92: 66 TSP 
112: 777 TSP 	118: dfgg TSP 	

Very Neg. Very Pos.

COM:					
TSP:					
LAB:					
ADM:					
SAN:					

Overall Recommendation:

Click on the hyperlinked titles in the IOB to display the original text here.

Hyperlinked



Positive vs Negative

**1/2 of Subjects should make
a decision that is **Positive**:**

3 of 5 criteria are Positive

**1/2 of Subjects should make
a decision that is **Negative**:**

3 of 5 criteria are Negative

Positive Criterion: 4 of the 6 statements are positive

Negative Criterion: 4 of the 6 statements are negative



IOB Subjective Assessment

One Last Request: Please select one of the options below in terms of how useful the IOBs were in making your scoring decision (this would be as versus just seeing the text listing of the items you assigned to each criterion)

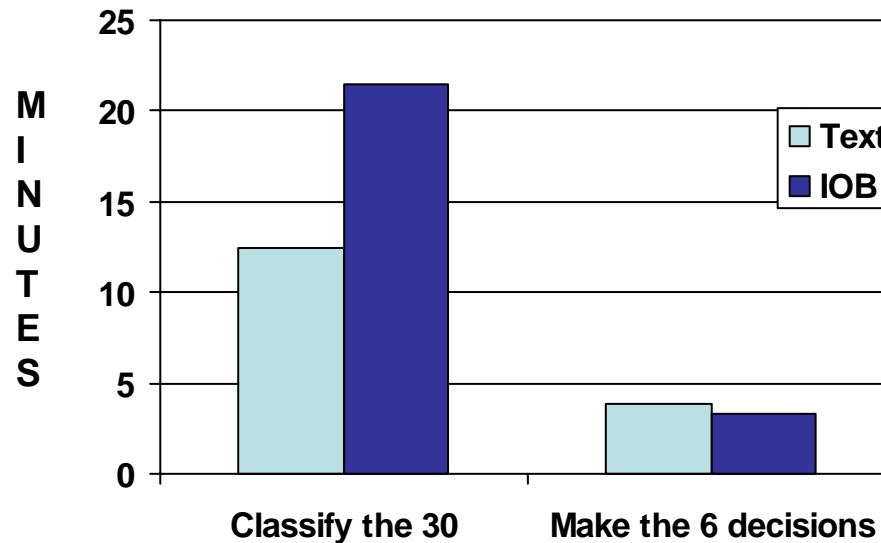
Somewhat distracting	No Effect	Helped Somewhat	Helped a lot
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
			<input type="button" value="Submit"/>



RESULTS



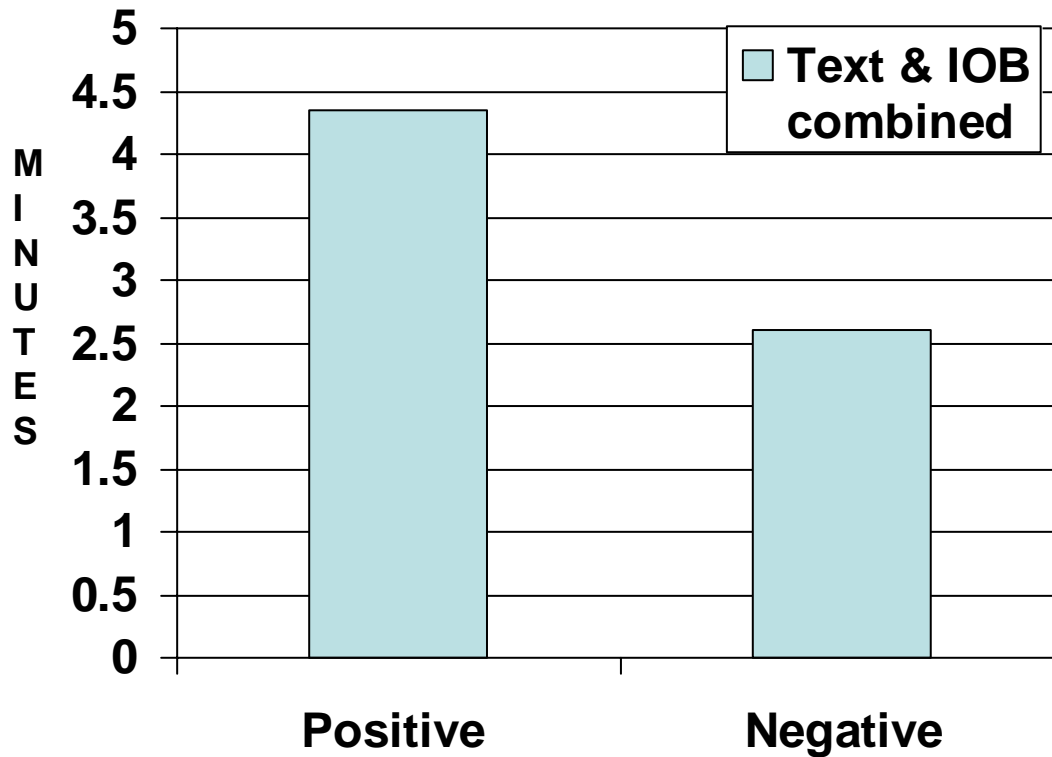
Time Factor



IOB subjects took an average 18 seconds longer per item to enter keyword and make evaluation



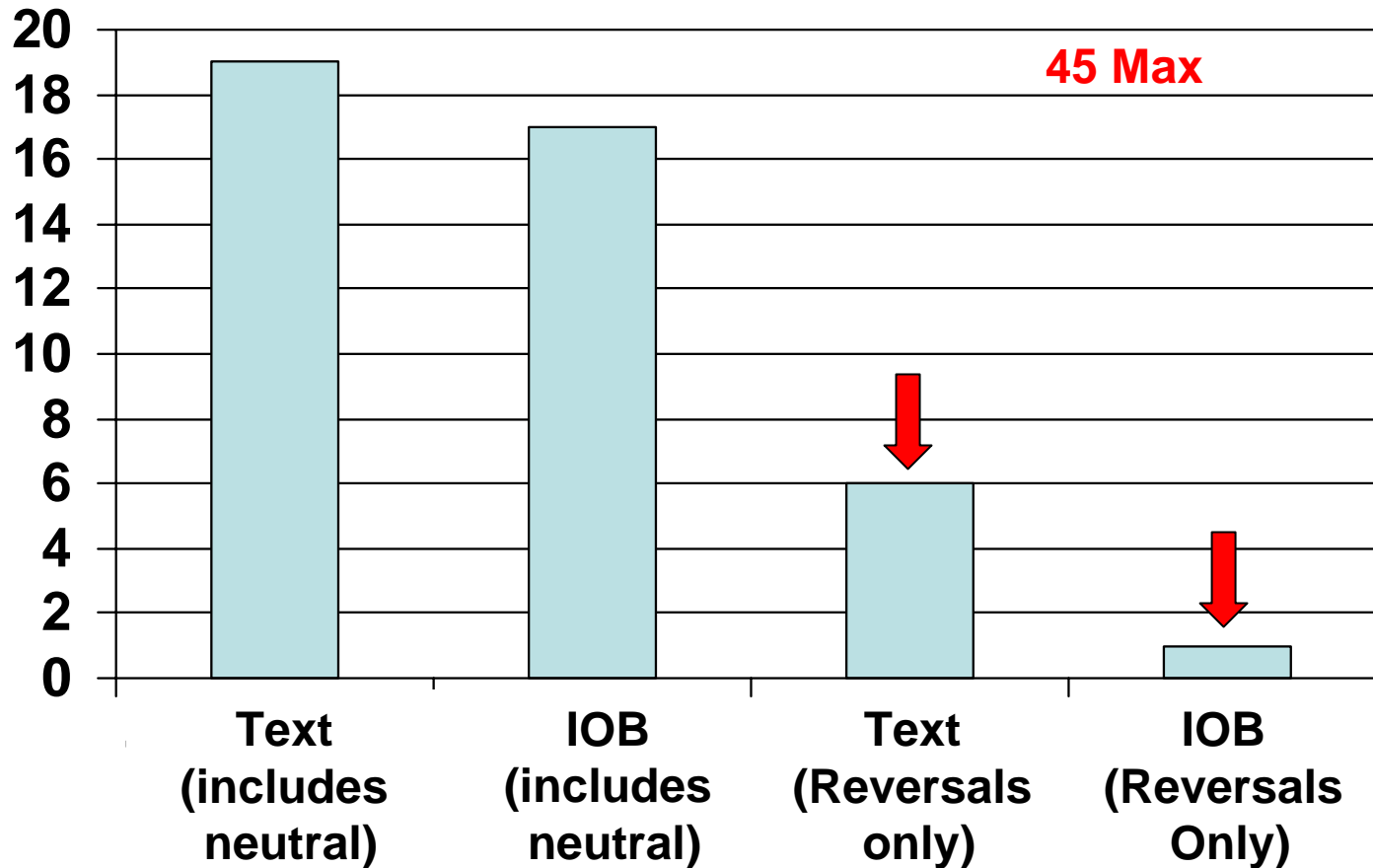
TIME TO MAKE DECISIONS



Participants took significantly longer to complete the decision process when the predominance of information was positive.

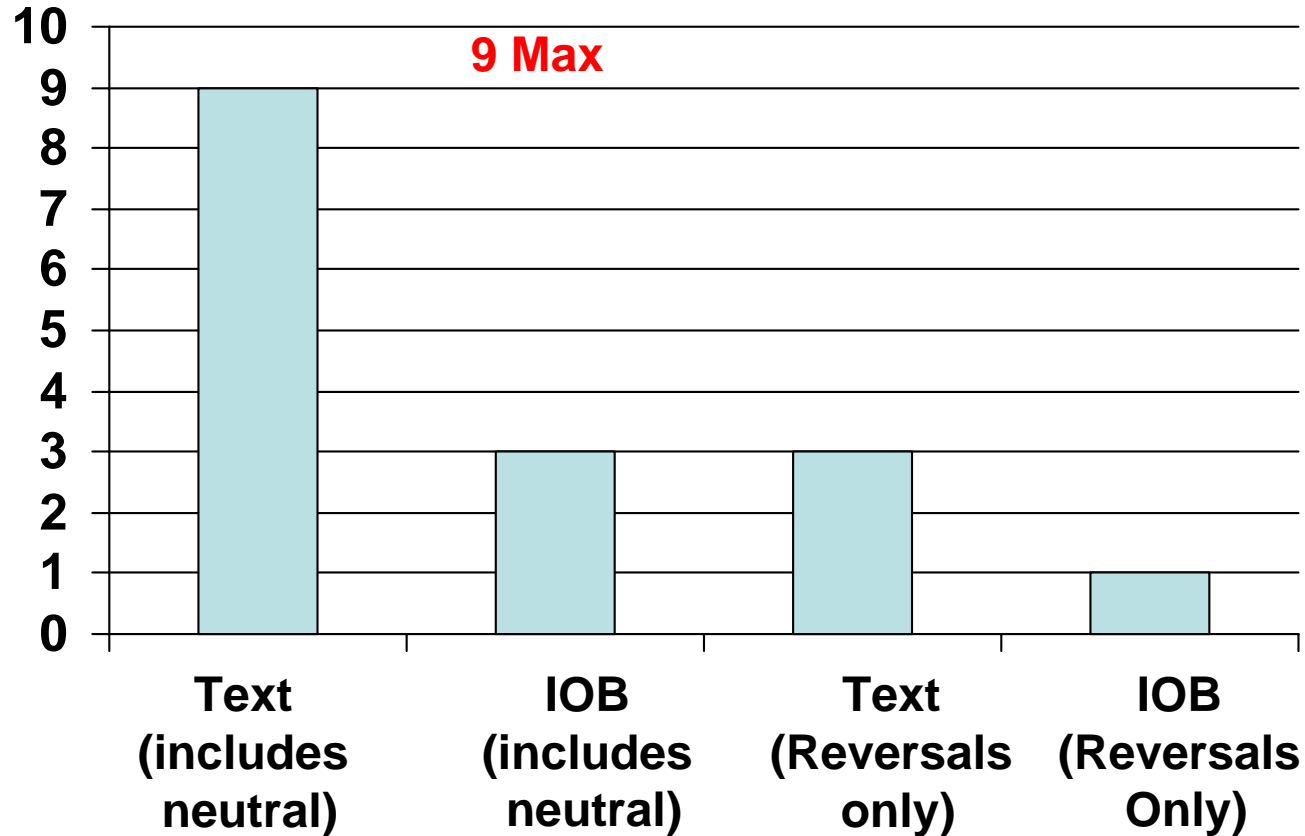


Errors in Criterion Scoring



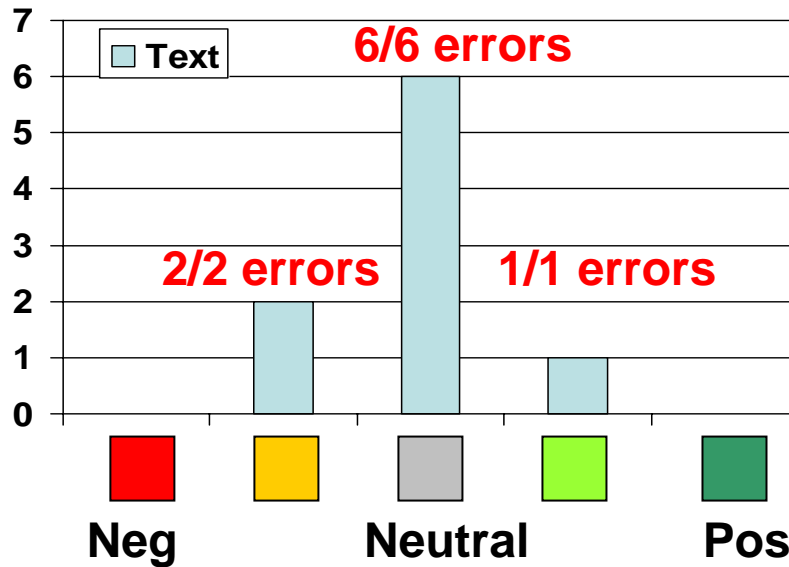


ERRORS OVERALL



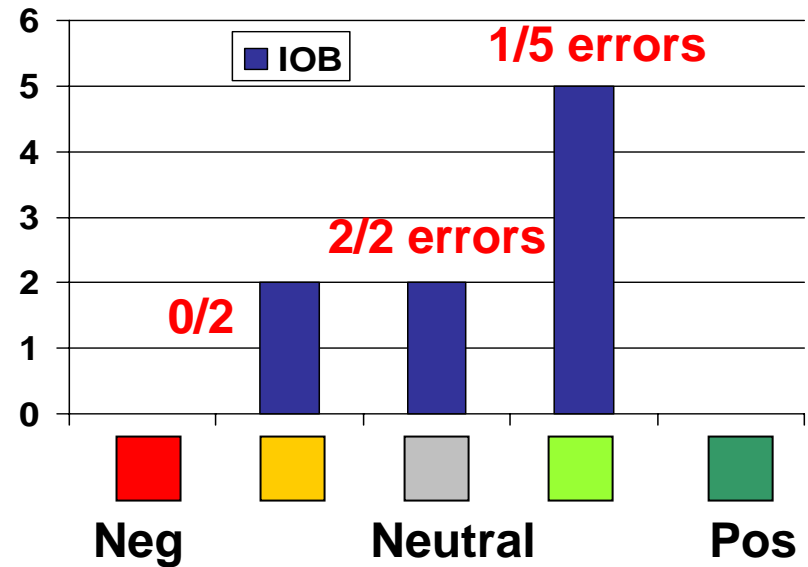
Overall Ratings

Overall Final Ratings



0/9 Correct Decisions!

Overall Final Ratings



6/9 Correct Decisions!

The Two Display Conditions:

TEXT

View: Go

Communications

The environmental protection effort in Islandia is poorly organized has has little effect. Environmental impact is not a consideration is any awarding of construction permits.

A recent disaster simulation exercise in Islandia showed that the Emergency Medical Services were very inadequate in terms of handling anything other than the smallest disaster situation

.... The major ports of Islandia are less than three days sailing from the primary disaster recovery supply center at Naha. Naha also has three supply ships that are permanently loaded to be used in quick response assistance...

Every small town in Islandia has at least one phone

...The major air route to Islandia is from Chenche. That route, however, requires that we fly over the nation of Oambist, and Oambist has denied permission to fly over their airspace. The two options are to modify the flight plan or to use another departure airport. Both of these options results in excessively long flights, limits cargo capacity, and reduces the daily amount of supplies that can be transported to Islandia..

Very Neg. Very Pos.

COM: ☐ ☐ ☐ ☐ ☐

TSP: ☐ ☐ ☐ ☐ ☐

LAB: ☐ ☐ ☐ ☐ ☐

ADM: ☐ ☐ ☐ ☐ ☐

SAN: ☐ ☐ ☐ ☐ ☐

Overall Recommendation: ☐ ☐ ☐ ☐ ☐

Submit Reset

0 out of 9 Correct Overall Decisions

IOB

View: Go

Communications

104: ZZ COM <input type="radio"/>	109: 99 COM <input type="radio"/>	95: 666 COM <input type="radio"/>
114: 567 COM <input type="radio"/>	121: tttt COM <input type="radio"/>	99: 11 COM <input type="radio"/>
120: prtt COM <input type="radio"/>		

Transportation

100: 22 TSP <input type="radio"/>	105: ZZ5 TSP <input type="radio"/>	96: ZZZ TSP <input type="radio"/>
94: ports TSP <input type="radio"/>	93: 666 TSP <input type="radio"/>	92: 66 TSP <input type="radio"/>
112: ZZZ TSP <input type="radio"/>	118: dfgg TSP <input type="radio"/>	

Very Neg. Very Pos.

COM: ☐ ☐ ☐ ☐ ☐

TSP: ☐ ☐ ☐ ☐ ☐

LAB: ☐ ☐ ☐ ☐ ☐

ADM: ☐ ☐ ☐ ☐ ☐

SAN: ☐ ☐ ☐ ☐ ☐

Overall Recommendation: ☐ ☐ ☐ ☐ ☐

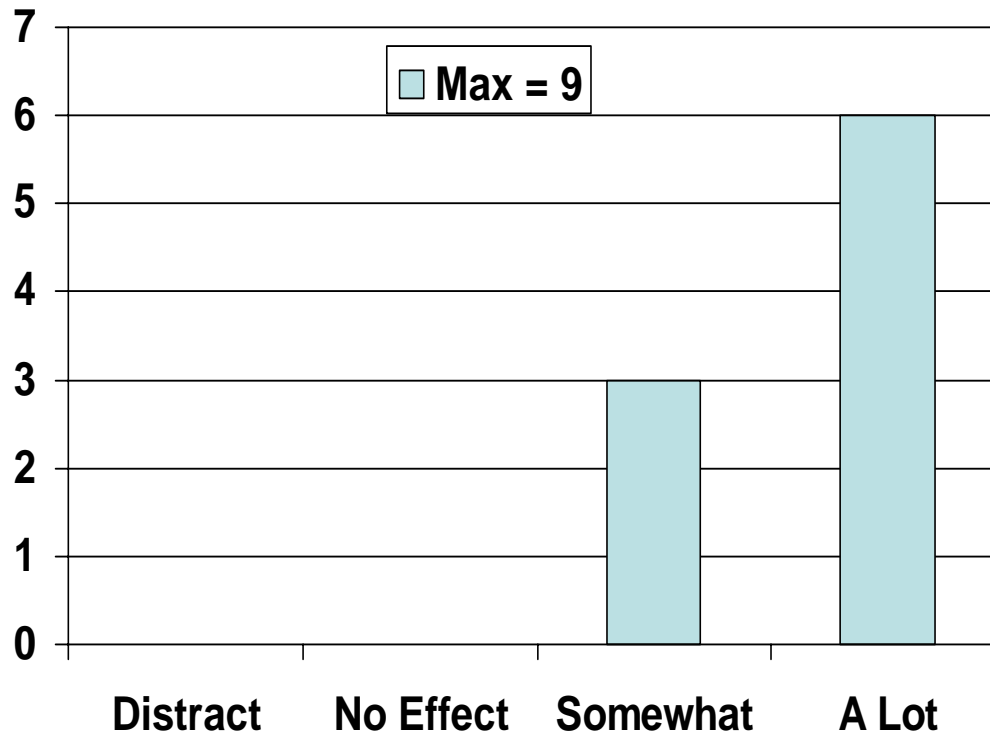
Submit Reset

Click on the hyperlinked titles in the IOB to display the original text here.

6 out of 9 Correct Overall Decisions



IOB Subjective Assessments



IOBs HELP?



Research Summary:

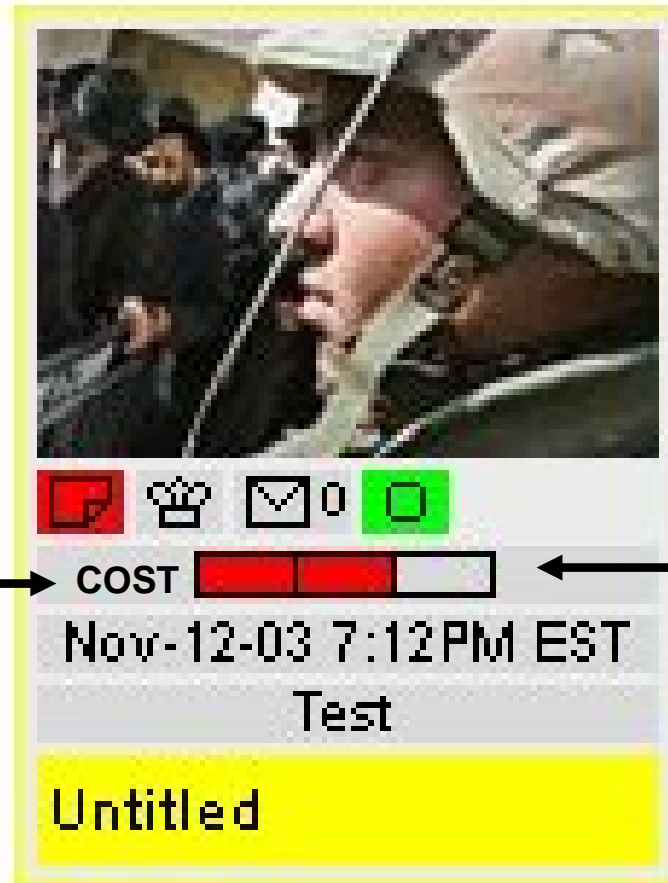
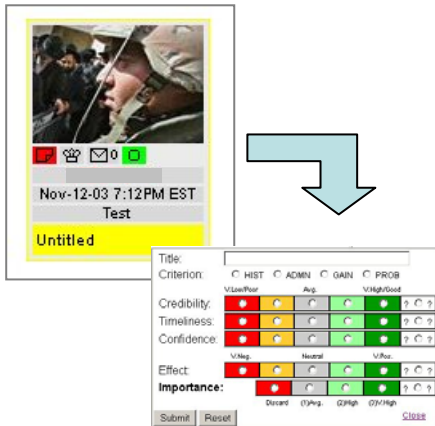
- Decision time same for Text and IOB.
- Decision time longer for positive information.
- Text participants make more reversal errors in scoring individual criteria.
- In making Overall decisions:
 - Text more likely to use Neutral rating.
 - Text more likely to make reversal errors.
 - IOB make more accurate decisions.
- IOB participants feel IOBs are helpful/useful.



Hidden Profile Experiment

- Subjects saw 12 information items, leading to a Positive or Negative recommendation
- Then saw 10 more items that should cause a reversal in the recommendation
- Out of 20 eligible subjects, only 7 (35%) detected the hidden profile.
- Shifting from Negative to Positive was significantly more difficult (1 out of 6)

Interface with EWALL project



This news item has a Very Negative impact on the Cost criterion, is of High Importance and is of acceptable/good Quality



Expected Final Products

- A shrink-wrapped software package:
 - Runs in the background on a WAN or LAN
 - Set-up by the assigned decision-task group
 - User-designed abstraction template
 - IOB Generation algorithm
 - Optimized sorting, analysis package
 - Group interactive IOB display area
 - Uses existing COTS audio/visual collaborative system to reduce conflict, reach consensus.



Possible Application areas

- Proposal submitted to Home Land Security:
 - “Information Objects (IOBs): A Knowledge Management Tool for Information Fusion, Correlation And Distribution”
- Proposal submitted to DDR&E
 - “Iconic Abstractions of Subjective Knowledge for Asynchronous Collaboration”
- DCODE briefed to Counter Drug Investigation Center (CIC)



Recent/Planned Publications

- **Information Exchange and Display in Asynchronous C2 Group Decision Making.** Paper presented at 8th International Command and Control Research and Technology Symposium, Washington D.C., June 2003.
- **The Effects of New Information on Decision Modification: The Role of Display Format and Direction of Impact.** SSC-SD Technical Report, in prep, Jan 04.
- **Improving Individual and Team Decisions Using Iconic Abstractions of Subjective Knowledge.** Paper submitted to 9th International Command and Control Research and Technology Symposium, San Diego, June 2004.
- **An experimental comparison using text documents versus iconic representations in complex decision making,** SSC-SD Technical Report, in prep., Jan 04
- **Essential information characteristic needed for any retained decision-relevant information item.** SSC-SD Technical Report, in-progress.



IOB On-Line Demo

Available at two sites:

<http://64.66.5.34/demo/>

<http://www.ocf.berkeley.edu/~slinlee/dcode/demo/>

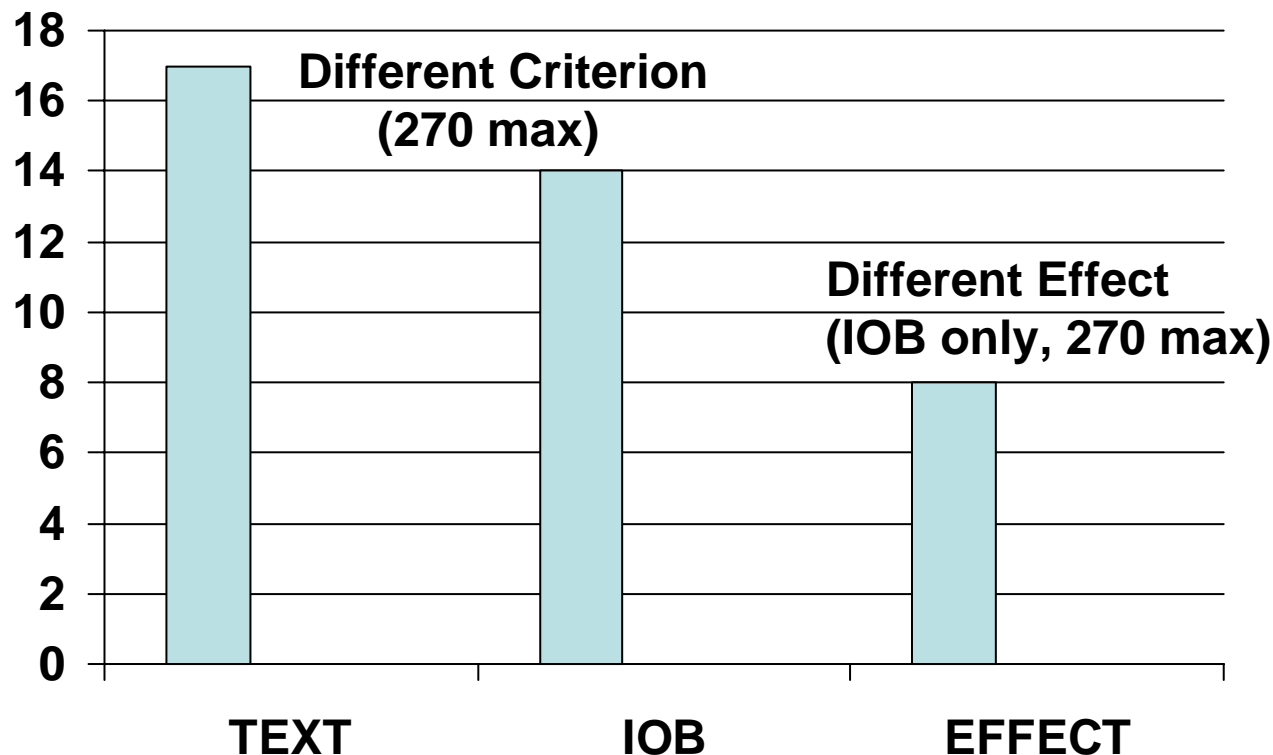




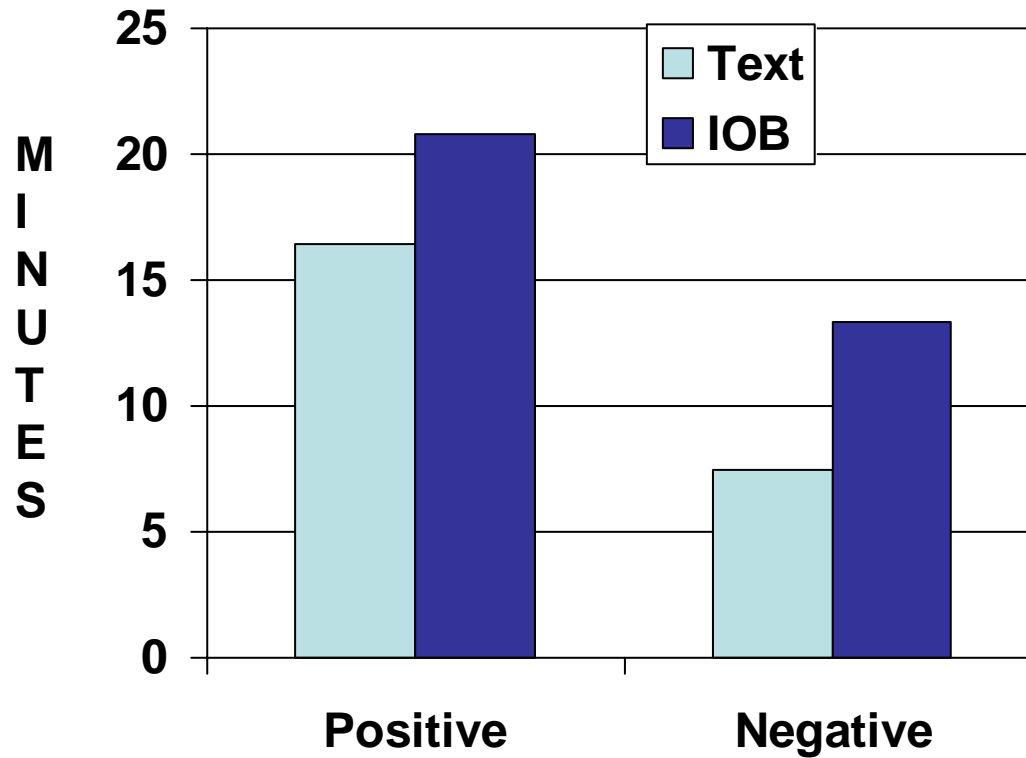
Back-up slides



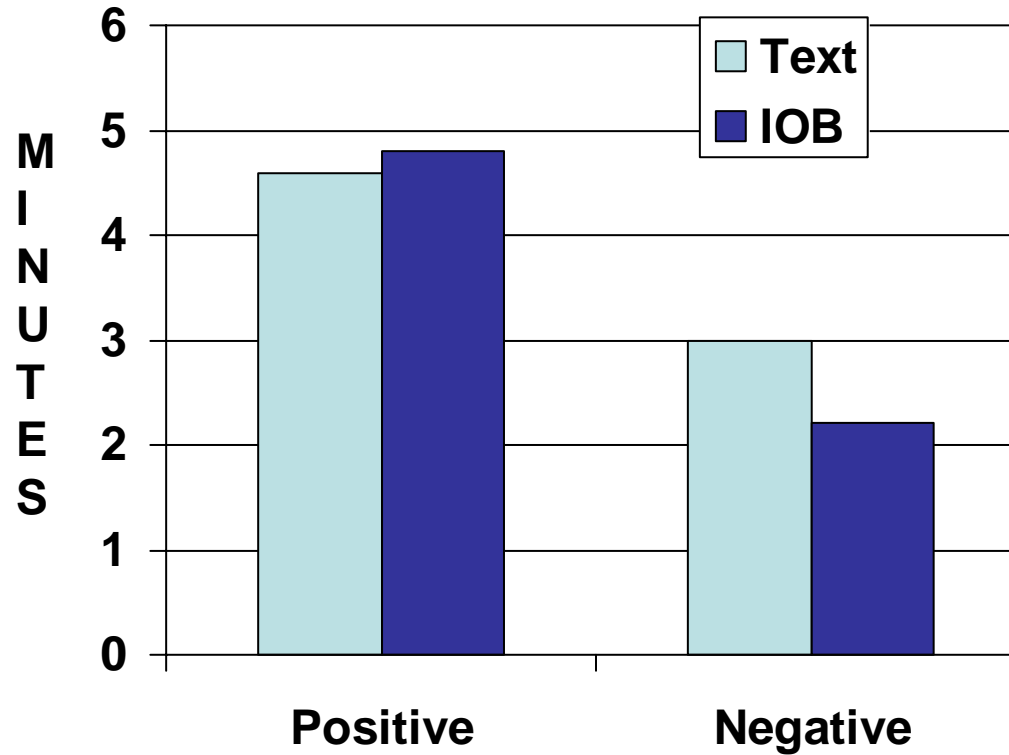
Assigned to DIFFERENT Crit.



Overall time

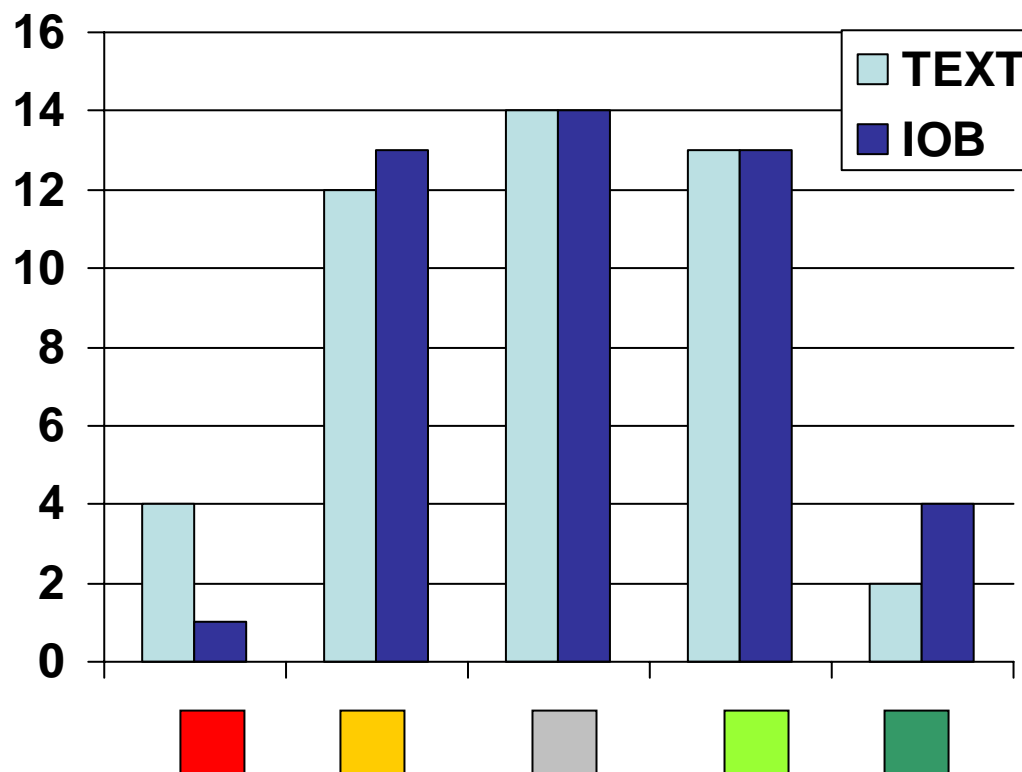


Dec time



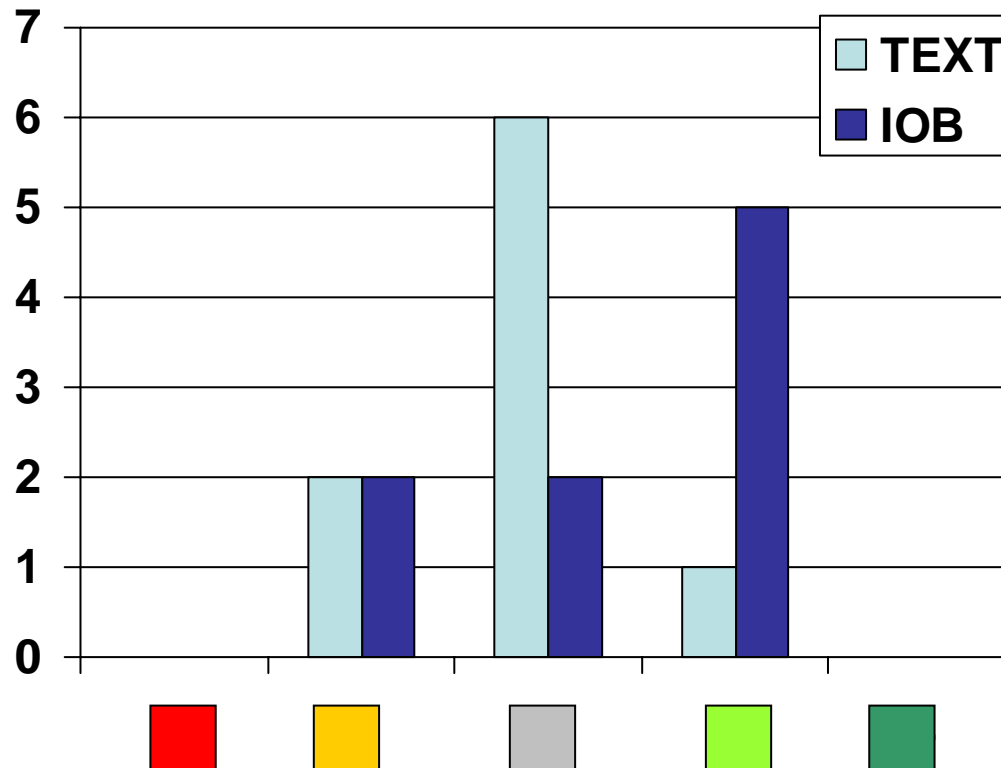


Score Assignment to Criteria



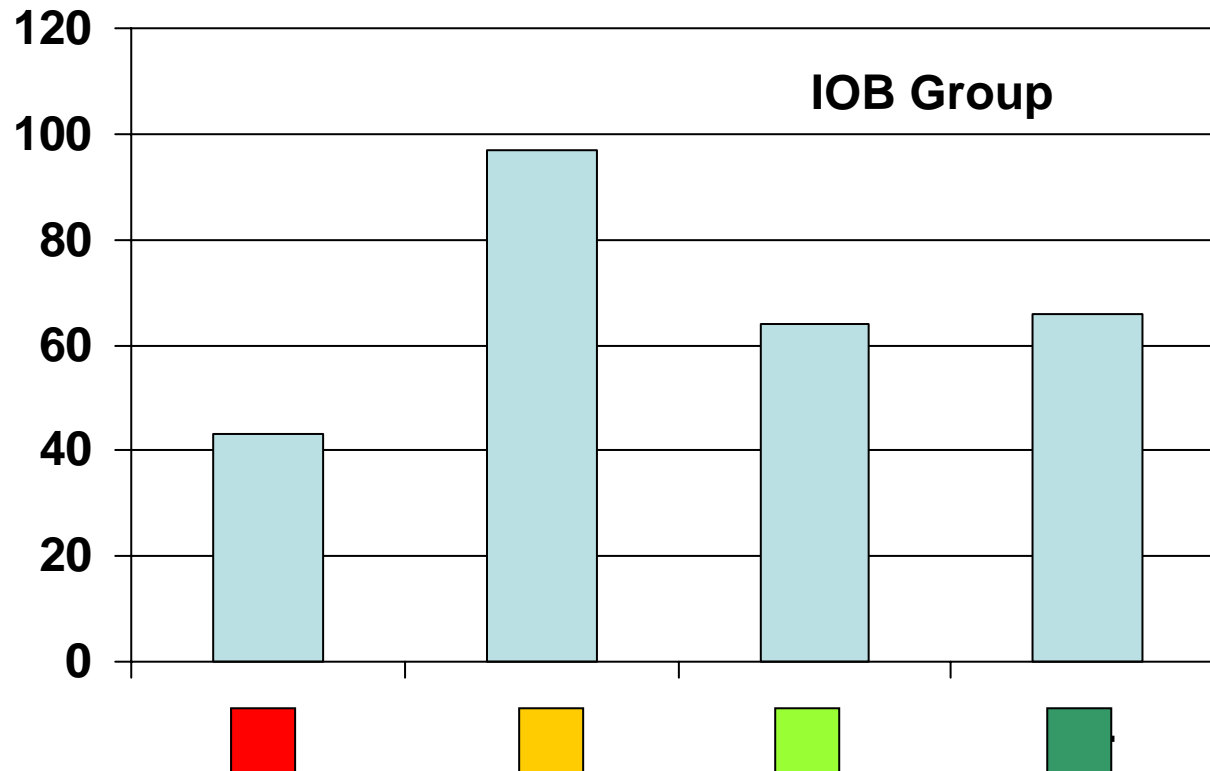


Score Assignment to Overall





Scoring Assignments by IOB





Research Questions

- What are the critical subjective information assessments (parameters) that each individual assigns to a retained information item?
- How can we quantitatively capture these assessments without placing an undue cognitive burden on the individual?
- How do we best display this captured information to improve the ability of the individual to make an overall assessment of his information pool?
- How do we display, share and transfer this captured information to ensure that the group sees and uses to the entire pool of relevant information to reach consensus on the final overall group recommendation?



Decision Making Requirements

- Once a group has been assigned a decision making task, they need to determine two critical issues:
 - What are the **decision criteria** (factors) that we will use?
 - e.g. Cost, Risk, Duration, etc.
 - How many **options** (COAs) are we considering?
 - One (Yes/No, Go/No Go)
 - Should we do A?
 - Multiple COAs
 - Should we do A or B or C or?



Template changes only slightly from task to task

Different Decision Tasks modify only 2 parameters of the Abstraction Template:

Criteria



of "Effect"
rating scales
(# of COAs)



Title: **PK**

Criterion: ☐ READ ☐ RSOR ☐ COST ☐ PROB

V.Low/Poor Avg. V.High/Good

Credibility: ☐ ☐ ☐ ☐ ☐ ? ☐ ?

Timeliness: ☐ ☐ ☐ ☐ ☐ ? ☐ ?

Confidence: ☐ ☐ ☐ ☐ ☐ ? ☐ ?

V.Neg. Neutral V.Pos.

Effect MPAC ☐ ☐ ☐ ☐ ☐ ? ☐ ?

Importance: ☐ ☐ ☐ ☐ ? ☐ ?

Discard (1)Avg. (2)High (3)V.High

Save/Share **Save** **Reset** [Close](#)

Buy a Car

Volvo **Cost**
Ford **MPG**
Buick **Maint**

Locate a Factory

Tampa **Taxes**
LA **Cost**
Dallas **Labor**

Remove Surv. Site

Destroy **Assets**
Jam **Time**
IO **Risk**

Converting Subjective Assessment to EQI Display

Airport Security Gets Another 'F'

LOS ANGELES, Sept. 3, 2002

VIDEO

Screener Flunk CBS Test



(Photo: CBS/AP)

QUOTE

Screener in Atlanta and Washington's Reagan National didn't check any of our film bags six months ago, and again they missed all of them this time.

(CBS) In January and February, CBS News went undercover to test security at major American airports. We took lead-lined film bags, which block X-rays, through checkpoints.

Steve Elson, who used to test checkpoint security for the Federal Aviation Administration, helped us with our tests.

"When the bag goes through the X-ray, there's a big black blob," says Elson. "They're impossible to miss and yet they just continually let it go."

Screener could not clearly see what was in our carry-ons and should have searched them, because a weapon could have been hidden in or under the film bags.

But 70 percent of screeners failed to check or even detect the film bags. At the time, the Transportation Security

This article is Negative in supporting the decision criterion and is rated of High importance. Some question as to Quality of the information.



Guest Comment

On NRO

Security, Smith's Way

The cyber model.

By James D. Miller, assistant professor of economics, Smith College
October 30, 2001 9:45 a.m.

Unleash the marketplace to strengthen airport security. The socialistic solution of federalizing airport-security workers will deny us the creativity we need to fight terrorists. Only by utilizing the constant competition that the free market provides can we protect America's skies.

Computer networks have to endure incessant attacks from hackers. Network providers have to continually strengthen their defenses to ward off new types of assaults. Hackers have consequently increased computer security and have made the U.S. more resistant to terrorist cyber-attacks. Computer security is not provided by the government, but rather by a marketplace that punishes any firm that can't protect its electronic assets. America's airplanes should be protected by a similar free market approach.



This article is Very Positive in supporting the decision criterion and is rated of Very High importance. Information Quality is acceptable/good



This article is Very Negative in supporting the decision criterion and is rated of Average importance. Information Quality is acceptable/good

